Building Envelope Technology Team Meeting

March 28, 2017
2:00-3:00 pm EST
Agenda

- Welcome and Introductions
  - Melissa Lapsa, Oak Ridge National Laboratory (ORNL)
- Overview of Building Envelope Technology Solutions Team
  - The skinny on: What is it? How are we working with members? How can you get involved?
- Better Buildings Partner Retrofit Case Study Profile
  - Dr. Alexander Zhivov, US Army Corps of Engineers
- Evaluation of Airtightness Requirements for New Commercial Buildings
  - Dr. Diana Hun, ORNL
Overview of Building Envelope Technology Solutions Team
Better Buildings Alliance: How is it organized?

**MARKET SOLUTIONS TEAMS**
- Energy Efficiency Project Financing
- Leasing and Tenant Build-Out
- Energy Data Access
- High Performance Property Valuation and Mortgages

**TECHNOLOGY SOLUTIONS TEAMS**
- Lighting & Electrical
- Space Conditioning
- Plug & Process Loads
- Refrigeration
- Energy Management Information Systems
- Renewables Integration
- NEW! Building Envelope

To join, contact Melissa Lapsa at lapsamv@ornl.gov
Building Envelope Technology Team

Connecting Better Building Alliance members with advanced building envelope technology solutions

- Demonstrations
- Specification documents
- Case studies and fact sheets
- Calculators and analytic tools

Melissa Lapsa, M.B.A.
Simon Pallin, Ph.D.
Mahabir Bhandari, Ph.D.
Caroline Hazard, M.S.
Poll Question 1

Which type of organization best describes you or the work you do?

- Building Owner/Manager
- Architect/Engineer
- Manufacturer
- Energy Service Providers
- Researcher/Academia

If your organization type isn’t listed, please type into your Questions Window the kind of organization you represent.
The commercial **building envelope** is the **primary determinant** of the amount of **energy required** to heat, cool, and ventilate a building.
Barriers Identified for Envelope Technologies

- **Cost**: uncertainties, high first costs, ROI hurdles
- **Supply issues**: product fragility, availability, volume
- **Installation issues**: workforce training, complex systems, quality control
- **Decision culture**: resistance to new products, risk averse, code minimum culture
- **Information gap**: real world case studies, data on long-term performance, communicating effectively
Envelope Market Barriers are Complex

Which barrier is of most concern when investing in envelope technologies?

- Overcoming a risk-averse culture ranks highest with the other barriers ranking closely behind
- Cost ranks as highest concern for building owners/managers
- Installation concerns were not raised by building owners/managers, but they were for A&E firms
- Overcoming a risk-averse decision making culture ranks as highest for A&E firms

N=180. Responses from 2016 Webinar Series

What resources, aside from financing, would help advance investment in commercial building envelope technologies?

- Case studies with ROI, payback, and performance documented
- Decision analysis tools, calculators
- Less disruptive technologies
Understanding the Challenges and Needs

Gathered feedback from stakeholders* on the best methods for addressing barriers to adoption

Which resources would help advance investments in energy-saving envelope projects?

<table>
<thead>
<tr>
<th>Resource Type</th>
<th>Owner/Manger Participant Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation Guidance</td>
<td>14%</td>
</tr>
<tr>
<td>Case Studies</td>
<td>12%</td>
</tr>
<tr>
<td>Demo Projects</td>
<td>17%</td>
</tr>
<tr>
<td>Decision Analysis Tools</td>
<td>13%</td>
</tr>
<tr>
<td>Performance Specifications</td>
<td>18%</td>
</tr>
</tbody>
</table>

Drilling in on responses by building owner/managers participants:

FY '17 Focus: ✓ Demo projects to validate windows and air barrier technologies
✓ Air barriers market analysis to identify specifications guidance

What will the Envelope Tech Team be doing?

Engage and support Members in efforts to accelerate adoption of building envelope technologies

- **Build awareness** with guidance and information on envelope technology solutions
- Conduct envelope technology demonstrations
- Offer technical assistance for envelope projects

https://betterbuildingsinitiative.energy.gov/alliance/technology-solution/building-envelope
# Tech Demo Opportunities

## Technology
- Air Barrier Systems

## Buildings Criteria
- Building envelope retrofit construction or planned façade retrofit projects, 30,000 sq. ft or greater

## Key Sectors
- All

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Email Melissa Lapsa: [lapsamv@ornl.gov](mailto:lapsamv@ornl.gov)
# Meet our Members and Supporters

## Envelope Technology Solutions Team

<table>
<thead>
<tr>
<th>Member Organization</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arlington County</td>
<td>Building Owner/Manager</td>
</tr>
<tr>
<td>Clark Atlanta University</td>
<td>Building Owner/Manager</td>
</tr>
<tr>
<td>Hersha Hospitality Management</td>
<td>Building Owner/Manager</td>
</tr>
<tr>
<td>Legacy Health</td>
<td>Building Owner/Manager</td>
</tr>
<tr>
<td>US Army Corps of Engineers</td>
<td>Building Owner/Manager</td>
</tr>
<tr>
<td>Newmark Grubb Knight Frank</td>
<td>CRE management</td>
</tr>
<tr>
<td>Exp.com</td>
<td>Architect/Engineer</td>
</tr>
<tr>
<td>Association for Energy Affordability</td>
<td>Architect/Engineer</td>
</tr>
<tr>
<td>Instituto Superior de Engenharia do Porto</td>
<td>Architect/Engineer</td>
</tr>
<tr>
<td>Z2zero</td>
<td>Architect/Engineer</td>
</tr>
<tr>
<td>D. Schmidt Consulting</td>
<td>Architect/Engineer</td>
</tr>
</tbody>
</table>

## Supporters

- Apple Blossom Energy
- Argonne Nat’l Lab
- Building Envelope Materials (BEM)
- Covestro LLC
- ICF
- NRG Insulated Block
- Renovate by Berkowitz
- Rmax Operating
- Quadlock
- Solaria

**Join the Team!**  
Email: lapsamv@ornl.gov
Open Poll Question 2

Using Chat, type in what enclosures system topics or challenges would you like to work with the Envelope Tech Team on?

- Perhaps technology specific?
- Perhaps market barrier specific?
- Perhaps installation best practices?
- Perhaps related to building enclosure commissioning (testing)?
- Other?

Please type your thoughts into your Questions Window
Deep Energy Retrofit -
A Guide to Achieving Significant Energy Use Reduction with Major Renovation Projects
<table>
<thead>
<tr>
<th>Category</th>
<th>Name</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building Envelope</td>
<td>Roof insulation</td>
<td>Level defined through modeling</td>
</tr>
<tr>
<td></td>
<td>Wall insulation</td>
<td>Level defined through modeling</td>
</tr>
<tr>
<td></td>
<td>Slab Insulation</td>
<td>Level defined through modeling</td>
</tr>
<tr>
<td></td>
<td>Windows</td>
<td>Parameters defined through modeling</td>
</tr>
<tr>
<td></td>
<td>Doors</td>
<td>National Standards</td>
</tr>
<tr>
<td></td>
<td>Thermal bridges remediation</td>
<td>Guide, main text, and Appendix D</td>
</tr>
<tr>
<td></td>
<td>Air tightness</td>
<td>0.15 cfm/ft² (for USA)</td>
</tr>
<tr>
<td></td>
<td>Vapor Control</td>
<td>Guide, main text</td>
</tr>
<tr>
<td></td>
<td>QA</td>
<td>Guide, Appendix J</td>
</tr>
<tr>
<td>Lighting and Electrical Systems</td>
<td>Lighting design , technologies and controls</td>
<td>Guide, Appendix G</td>
</tr>
<tr>
<td></td>
<td>Advanced plug loads, smart power strips and process equipment</td>
<td>TopTen (Europe), Top Tier EnergyStar, FEMP Designated, etc.</td>
</tr>
<tr>
<td>HVAC</td>
<td>High performance motors, fans, furnaces, chillers, boilers, etc</td>
<td>ASHRAE Std 90.1 2013 and EPBD</td>
</tr>
<tr>
<td></td>
<td>DOAS</td>
<td>Guide, main text</td>
</tr>
<tr>
<td></td>
<td>HR (dry and wet)</td>
<td>Guide, main text</td>
</tr>
<tr>
<td></td>
<td>Duct insulation</td>
<td>EPBD requirements</td>
</tr>
<tr>
<td></td>
<td>Duct airtightness</td>
<td>ASHRAE Handbook and EPBD requirements (Class C ductwork)</td>
</tr>
<tr>
<td></td>
<td>Pipe insulation</td>
<td>EPBD requirements</td>
</tr>
</tbody>
</table>
Air Tightness in New and Retrofitted US Army Buildings

Dr. Alexander Zhivov

US Army Engineer Research and Development Center,
Construction Engineering Research Laboratory
2902 Newmark Drive, Champaign, IL, USA.

March, 2014
Building Envelope Leakage Contributes to Energy Inefficiency and Mold

- Many older buildings have significant problems with exterior walls that would affect their useful life and allow air and water penetration
- High cooling and heating loads due to problems with the building envelop (insulation, air barrier)
- Poor control of moisture penetrating the building (moisture dams, vapor barrier)
- Most of energy wastes and mold issues come hand-in-hand
Extended envelope surface, e.g., open courtyard

Excessive heat losses and gains through the extended building envelope (external wall surface can be reduced), additional sensible and latent load on heating and cooling systems.
Some holes for new pipes through pipe-chase walls are much larger than the size of these pipes.

Holes from old pipes are left open.

Unsealed chases between floors and the attic.
Problems with the building envelope design and construction: Standing Seam Metal Roofs Have Openings to the Interior or Attic Space
Doors Lacking Door Seals

Excessive heating and cooling losses due to air leaks through poorly sealed doors resulting in increased sensible and latent load on heating and cooling systems.
Air Barrier and Mold Problems
ERDC Air barrier Testing 2006-2008
Existing Army Barracks Constructed without Air Tightness Requirement – Test Results

Ft Meyer UEPH tested Feb06

- Tested by ERDC/CERL
- Measured leakage rate was 0.57 CFM/sq ft (2.89 L/s*m²) envelope area @ 75Pa

Ft Bragg UEPH tested May 06

- Tested by ERDC/CERL
- Measured leakage rate unrenovated was 0.56 CFM/sq ft (2.84 L/s*m²) envelope area @ 75Pa
- Measured leakage rate for renovated was 0.77 CFM/sq ft
Percentage of Annual Energy Savings due to Improved Building Air Tightness
(Modeling results from Annex 46)

Air leakage is measured in cfm per ft² of the total (6 sides of the building envelope) at pressure difference between inside and outside air equal to 75Pa.

<table>
<thead>
<tr>
<th>Climate Zone</th>
<th>Energy Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>0%</td>
</tr>
<tr>
<td>2A</td>
<td>5%</td>
</tr>
<tr>
<td>2B</td>
<td>10%</td>
</tr>
<tr>
<td>3A</td>
<td>15%</td>
</tr>
<tr>
<td>3B</td>
<td>20%</td>
</tr>
<tr>
<td>3C</td>
<td>25%</td>
</tr>
<tr>
<td>4A</td>
<td>30%</td>
</tr>
<tr>
<td>4B</td>
<td>35%</td>
</tr>
<tr>
<td>4C</td>
<td>40%</td>
</tr>
<tr>
<td>5A</td>
<td>45%</td>
</tr>
<tr>
<td>5B</td>
<td>50%</td>
</tr>
<tr>
<td>6A</td>
<td>1A 2A 2B 3A 3B 3C 4A 4B 4C 5A 5B 6A 6B 7A 8A</td>
</tr>
</tbody>
</table>

### Source Leakage Rate at 0.3 in w.g. (75 Pa), cfm/ft²

<table>
<thead>
<tr>
<th>Source</th>
<th>Leakage Rate at 0.3 in w.g. (75 Pa), cfm/ft²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>1.0</td>
</tr>
<tr>
<td>ASHRAE Std 189.1 requirement (2009)</td>
<td>0.40</td>
</tr>
<tr>
<td>Current Army and ASHRAE Std 189 (2013) requirement</td>
<td>0.25</td>
</tr>
<tr>
<td>Proposed requirement for air sealing</td>
<td>0.15</td>
</tr>
</tbody>
</table>
Air Tightness Requirements to New Construction and Major Retrofit Projects
US Army Air Leakage Requirements and Testing Protocol

Developed by CERL in collaboration with USACE Omaha District and ABBA industry experts, mandatory part of RFP for MILCON Transformation and SRM projects

ENGINEERING AND CONSTRUCTION BULLETIN

Subject: Building Air Tightness Requirements

Applicability: Directive

ENGINEERING AND CONSTRUCTION BULLETIN

Subject: Building Air Tightness and Air Barrier Continuity Requirements

Applicability: Directive and Guidance

ECB No. 2012-16
Subject: Building Air Tightness and Air Barrier Continuity Requirements

- Garbage compactor rooms
- Emergency generator rooms
- High voltage rooms
- Shipping docks
- Elevator rooms
- Workshops.

5. Building Air Leakage Testing

The construction contractor’s testing agency shall demonstrate performance of the continuous air barrier for the building envelope by the following tests:

1. Test the completed building in accordance with the “U.S. Army Corps of Engineers Air Leakage Test Protocol for Building Envelopes, Version 3, February 21, 2012” (http://www.wbdg.org/References/ps_dod_energy.php), in accordance with UFC 3-101-01, and using the methods identified in ASTM’s E 779 and E 1827. Demonstrate that the air leakage rate of the building envelope does not exceed 0.25 cfm/ft² at a pressure differential of 0.3” w.g. (75 Pa). Accomplish tests using both pressurization and depressurization unless extenuating circumstances dictate testing in only one direction. Divide the volume of air leakage in cfm @ 0.3” w.g. (L/s @ 75 Pa) by the area of the pressure boundary of the building,
Air Barrier Concept and its Implementation

“Rule of the drawing pencil"

Air barrier boundaries shown on a building section and a plan
Building Airtightness Improvement (Major Renovation)
Air Barrier Continuity in Existing Buildings

How do we fix AB problems in existing buildings?

Seal the air leakage pathways in this order:

i. TOP
ii. BOTTOM
iii. VERTICAL SHAFTS
iv. OUTSIDE WALLS
v. COMPARTMENTALIZE

AIR BARRIER CONTINUITY: A QUICK GUIDE TO SEALING AIR LEAKAGE PATHWAYS IN BUILDINGS
http://www.wbdg.org/pdfs/usace_airbarrierccontinuity.pdf
Building Airtightness Improvement (Minor Renovation)
## Airtightness Best Practice Requirements

<table>
<thead>
<tr>
<th>Country</th>
<th>Source</th>
<th>Requirement</th>
<th>cfm/ft² @ 75Pa*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estonia</td>
<td>Ordinance No. 58. RT I, 09.06.2015, 21, 2015</td>
<td>( \leq 6 \text{ m}^3/(\text{h} \cdot \text{m}^2) ) @ 50Pa for renovation ( \leq 3 \text{ m}^3/(\text{h} \cdot \text{m}^2) ) @ 50Pa for new construction</td>
<td>0.42</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.21</td>
</tr>
<tr>
<td>Austria</td>
<td>OIB RL 6, 2011 for buildings with mechanical ventilation</td>
<td>1.5 l/h at 50 Pa</td>
<td>0.28</td>
</tr>
<tr>
<td>Denmark</td>
<td>Danish Building Regulations BR10</td>
<td>1.5 l/h at 50 Pa</td>
<td>0.28</td>
</tr>
<tr>
<td>Germany</td>
<td>DIN 4108-2</td>
<td>1.5 l/h at 50 Pa</td>
<td>0.28</td>
</tr>
<tr>
<td></td>
<td>USACE HP Buildings and DER proposed requirement</td>
<td></td>
<td>0.15</td>
</tr>
<tr>
<td>Latvia</td>
<td>Latvian Construction Standard LBN 002-01 for buildings with mechanical ventilation</td>
<td>2 m³/( m²h) at 50 Pa</td>
<td>0.14</td>
</tr>
<tr>
<td>UK</td>
<td>ATTMA-TSL2</td>
<td>2 m³/h/m² at 50 Pa</td>
<td>0.14</td>
</tr>
<tr>
<td>CAN</td>
<td>R-2000</td>
<td>1 sq in EqLA @10 Pa /100 sq ft</td>
<td>0.13</td>
</tr>
<tr>
<td>Germany</td>
<td>Passive House Std</td>
<td>0.6 l/h at 50 Pa</td>
<td>0.11</td>
</tr>
</tbody>
</table>

*Based on example for four-story building, 120 x 110 ft, n=0.65. [12]
USACE Design Requirements

• a) A continuous plane of air-tightness must be traced throughout the building envelope with all moving joints made flexible and sealed.

• b) The air barrier material(s) must have an air permeance not to exceed 0.004 cfm / sf at 0.3” wg [0.02 L/s.m2 @ 75 Pa] when tested in accordance with ASTM E 2178

• c) The air barrier material of each assembly shall be joined and sealed in a flexible manner to the air barrier material of adjacent assemblies, allowing for the relative movement of these assemblies and components.
Specified Testing Requirements

- Submit the qualifications and experience of the testing entity for approval.
- (a) Test the completed building and demonstrate that the air leakage rate of the building envelope does not exceed 0.25 cfm/ft² at a pressure differential of 0.3” w.g. (1.25 L/s.m² @ 75 Pa) in accordance with ASTM E 779 (2003) or E-1827-96 (2002)
500+ USACE New and Renovated Buildings “Passed”
0.25 CFM/ft²

<table>
<thead>
<tr>
<th>Location</th>
<th>Building Type / #</th>
<th>Air Barrier Envelope Size (ft²)</th>
<th>Result (CFM / ft²)</th>
<th>% Better than 0.25 CFM/ft²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ft. Bliss, TX</td>
<td>IBCT 1 UEPH 1</td>
<td>71,312</td>
<td>0.05</td>
<td>81%</td>
</tr>
<tr>
<td>Ft. Bliss, TX</td>
<td>IBCT 1 UEPH 2</td>
<td>71,312</td>
<td>0.06</td>
<td>76%</td>
</tr>
<tr>
<td>Ft. Sam Houston, TX</td>
<td>BRAC METC Dorm 1</td>
<td>371,099</td>
<td>0.07</td>
<td>73%</td>
</tr>
<tr>
<td>Ft. Bliss, TX</td>
<td>IBCT 1 UEPH 7</td>
<td>71,312</td>
<td>0.07</td>
<td>72%</td>
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<tr>
<td>Ft. Bliss, TX</td>
<td>BCT 3 UEPH 1</td>
<td>72,573</td>
<td>0.10</td>
<td>62%</td>
</tr>
<tr>
<td>Ft. Polk, LA</td>
<td>Barracks (Renovation)</td>
<td>52,476</td>
<td>0.10</td>
<td>60%</td>
</tr>
<tr>
<td>Ft. Sam Houston, TX</td>
<td>METC Dorm 1</td>
<td>141,893</td>
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<td>60%</td>
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<tr>
<td>Ft. Bliss, TX</td>
<td>BCT 3 TEMF1</td>
<td>24,632</td>
<td>0.13</td>
<td>48%</td>
</tr>
<tr>
<td>Ft. Riley, KS</td>
<td>COF</td>
<td>43,115</td>
<td>0.14</td>
<td>44%</td>
</tr>
<tr>
<td>Ft. Leonard Wood, MO</td>
<td>Battalion HQ</td>
<td>63,276</td>
<td>0.14</td>
<td>44%</td>
</tr>
</tbody>
</table>

AVERAGE AIR LEAKAGE RATE (CFM/SF@75PA)

NOTE: INCLUDING AN AIR LEAKAGE REQUIREMENT HAS RESULTED IN A 68% IMPROVEMENT IN OVERALL BUILDING AIR TIGHTNESS

Summary of Air Leakage Test Results of 270 Buildings by a Building Type.

Air Leakage vs. Building Type (min. 10 tests for bldg. type)

VOLAR Barracks Renovation, 2010

0.75 cfm/ft\(^2\) at 75 PA

0.1 cfm/ft\(^2\) at 75 PA
Current U.S.A. Air Sealing – Air Barrier Requirements

• ASHRAE Green Building Standard 189.1
  – Provides three options for compliance:
    1. Use air barrier materials on walls (0.004 cfm/ft²), or
    2. Use tested assemblies on walls (0.04 cfm/ft²), or
    3. Whole building test (0.25 cfm/ft²)

  – Path of least resistance is #1
Conclusion

- Specified requirements to air tightness of conditioned buildings or parts of buildings (0.25 cfm/ft² at 0.3 in w.g.[1.27 L/s*m² at 75Pa]) result in sustainable buildings, energy use reduction and improved soldiers wellbeing
- Contractor is provided with specific requirements to continuous air barrier and specific air tightness testing protocol
- US Army Corps of engineers conducts training in collaboration with the industry for involved actors (USACE and DPW engineers, architects and Project Managers, as well as to contractors to ensure understanding of requirements resulting in high quality of design and construction work
Conclusion

- USACE requires performance measurements after completion
  - These efforts result in development of the market in the USA for high quality construction and energy efficient retrofits
  - Since 2009, more than 500 buildings have been built and renovated to meet or exceed the Army requirement
  - Estimated first cost increase is $0.50/sq ft of floor area for new construction
  - Simple pay-back is 2-10 years
Conclusions

• Air barriers play an important role in building durability, energy use and occupants wellbeing;
• Till recently AB in the USA have been poorly integrated in the design and construction industry;
• Since 2009 industry has corroborated the USACE implementation of the air leakage requirement, which includes whole building performance verification testing.
• US Army has built and renovated more than 370 buildings to meet or exceed requirement for BE air tightness of 0.25 cfm/sq ft level.
• Based on experience, it is recommended that requirements for envelopes under 15,000 sq ft remain at the 0.25 cfm/sq ft level.
Conclusions (Cont)

• The data show the importance of including an experienced independent building envelope consultant on the project to review drawings and to perform site visits for quality control review;

• The USACE requirement has proven to be achievable and applicable to all building types and locations; it does not limit the design and construction process to any one set of materials or systems.

• The USACE move toward tighter buildings will continue, beginning with the tightening of the USACE requirement for an air tightness of 0.15 cfm/sq ft @75Pa for High-Performance Buildings. The data presented in this paper clearly indicate that these results are already achievable.
Questions or Comments??

Dr. Alexander Zhivov, Ph.D.
Senior Research Engineer,
US Army Engineer Research and Development Center
Alexander.M.Zhivov@usace.army.mil
Poll Question 3

Would you be interested in working with the Envelope Tech Team on developing resources (listed below) to address airtightness requirements?

- Installation or product specification guidance
- Case studies demonstrating best practices
- Case studies demonstrating energy and non-energy benefits
- Training tools for decision makers and designers

Other ideas? Please type them into your Questions Window
Evaluation of Airtightness Requirements for New Commercial Buildings

Presented to:

Building Envelope Tech Team

Diana Hun, PhD
R&D Staff
Building Envelope Systems Research Group
Oak Ridge National Laboratory

28 March 2017
Presentation’s Goals

- Project just started

- Feedback from Building Envelope Tech Team
  - Relevance of study
    - Building owners/managers
    - Construction industry
  - Tasks that need to be added/deleted
Effect of Air Leakage on Energy Consumption

US Primary Energy Consumption - 98 Quads

- Residential Buildings: 22 Quads
- Commercial Buildings: 19 Quads
- Industrial: 30 Quads
- Transportation: 28 Quads

Air Leakage: ~6%

Building Energy Data Book (Office of Energy Efficiency and Renewable Energy)
Project’s Goals

Help building owners/managers and the construction industry better understand key aspects of commercial building envelope airtightness

- Current airtightness requirements
- Methods to demonstrate compliance
- Feedback from stakeholders
- Summary of available measured air leakage rates
- Forecast for new commercial buildings

Please type yes or your email into chat window if you are interested in working with ORNL on this Study
Current Airtightness Requirements

- American Society of Heating, Refrigeration and Air-Conditioning Engineers
- International Energy Conservation Code
- Institutions
- Local governments: Seattle, New York City
Methods to Demonstrate Compliance

E779-10: Standard Test Method for Determining Air Leakage Rate by Fan Pressurization

Air Leakage Test Protocol for Building Envelopes
US Army Corps of Engineers®

Standard Method for Building Enclosure Airtightness Compliance Testing (in progress)

CAN/CGSB-149.10-M86: Determination of the Airtightness of Building Envelopes by the Fan Depressurization Method
Feedback from Stakeholders

• Consultants that conduct air leakage tests
  – National availability
  – Certification programs for consultants
  – Test cost and execution time and ways to decrease them
  – Documents provided to customer
  – Feedback from customers

• Customers that have requested air leakage tests
  – Information needed to make educated decisions
  – Benefits/drawbacks
  – Best practices
Summary of Available Measured Air Leakage Rates

- Building type
- Building size
- Number of stories
- Geographical area or heating degree days

[IIEC Climate Zones Map]
Forecast for New Commercial Buildings

- Gather predictions for new commercial construction
  - Building type
  - Building size
  - Geographical area

- Combine with
  - Availability of air leakage test consultants
  - Measured air leakage data
  - 2018 IECC proposed changes

- Determine markets that could benefit the most from improvements in airtightness
Project’s Goals

Help building owners/managers and the construction industry better understand key aspects of commercial building envelope airtightness

- Current airtightness requirements
- Methods to demonstrate compliance
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- Forecast for new commercial buildings

Please type yes or your email into chat window if you are interested in working with ORNL on this Study
Discussion

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Envelope Tech Team: What’s Next

Join us at the Better Buildings Summit

- **Hidden in Plain Sight**: presenting on Tech Team resources, including air barriers
- **Stranger Things**: presenting on emerging window and wall technologies
- **Ask-an-Expert Sessions**, lead by ORNL staff

Get involved!

- **Join** the team
- Send us your **feedback** on our Envelope Tech Team webpages
- Provide input on **airtightness requirements study**
- Collaborate on **demonstrations** of air barrier systems

Tech Expert/POC

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